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Solar & biomass for renewable district heating: examples across Europe

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'MODERN' DISTRICT HEATING: FLEXIBILITY AND RESILIENCE

- Integration and synergy among different renewable energy sources and technologies
- Therefore the district heating network becomes more resilient, less dependant on specific conditions (climate, market, availability of resources, user needs, etc.)

- This issue is also related to:
  - Sector coupling, for example through large heat pumps
  - Energy poverty
  - Energy communities…It's not only about electricity

@RiccardoBatt

'MODERN' DISTRICT HEATING: FLEXIBILITY AND RESILIENCE

My focus today is on **biomass + solar thermal**:

- Particularly suitable for small networks in rural and mountain areas
- Optimisation of biomass use with improvements in local air quality

BÜSINGEN (GERMANY)

- Wood chip + solar thermal
- 4.200 MWh/year, 5 km, 100 buildings

Source: Solarcomplex

BÜSINGEN (GERMANY)

- 2 Biomass boiler (900 and 450 kW)
- Back up boiler: 730 kW (fuel oil)
- Solar thermal: 1,090 m^2 (3,000 m^2 ground)
- 100 m^3 storage
- Wood chip savings: 600 m^3/year
- Large solar collectors

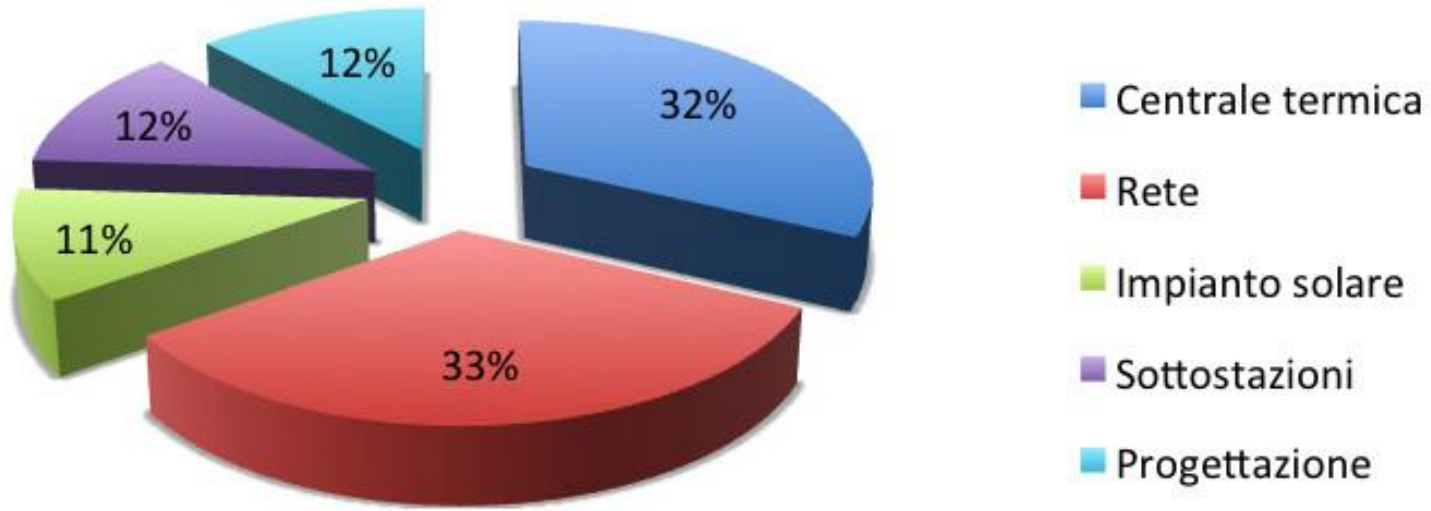
Source: Solarcomplex

BÜSINGEN (GERMANY)

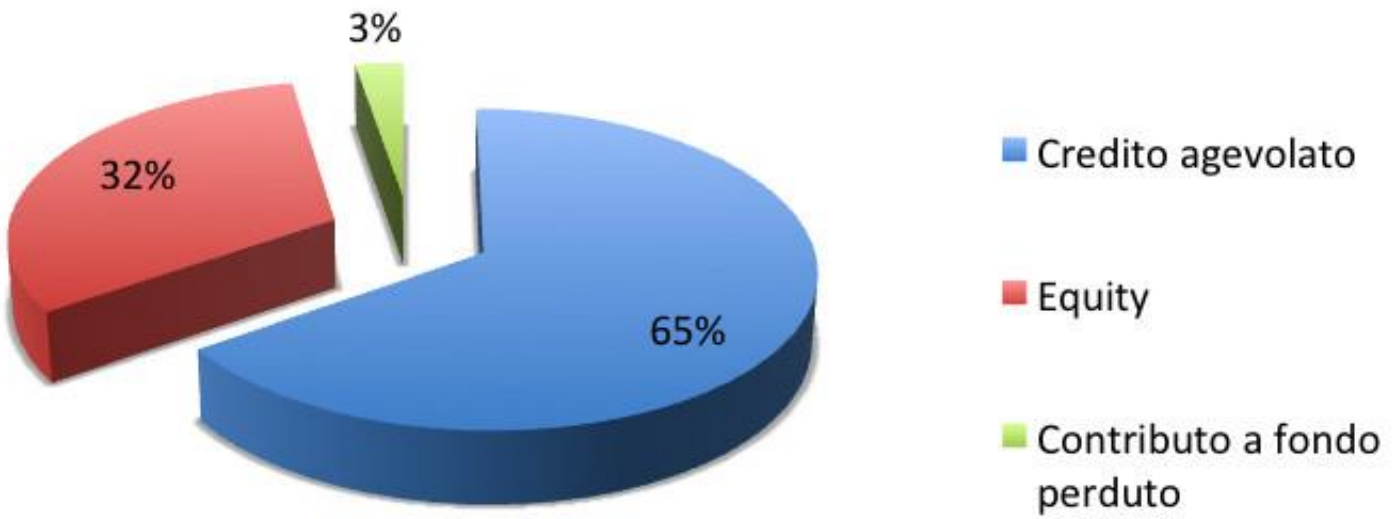
- Solar coverage: 100% in summer, 15% yearly average
- 60-70% of the consumers should sign a preliminary agreement

Investment and financing plan Büsingen	
heating plant (building incl. engineering)	1,200,000
heating network (>5.000 m)	1,250,000
solar thermal system (~1.000 sqm)	400,000
heat transfer stations in the buildings (> 100)	450,000
planning, external (approval, additional costs)	100,000
planning, internal (activated in-house effort)	350,000
TOTAL	3,750,000
own/share capital of solarcomplex AG	850,000
activated in-house effort	350,000
KfW bank loan (Erneuerbare Energien Premium)	2,450,000
subsidy Ministry of Environment BW	100,000
TOTAL	3,750,000

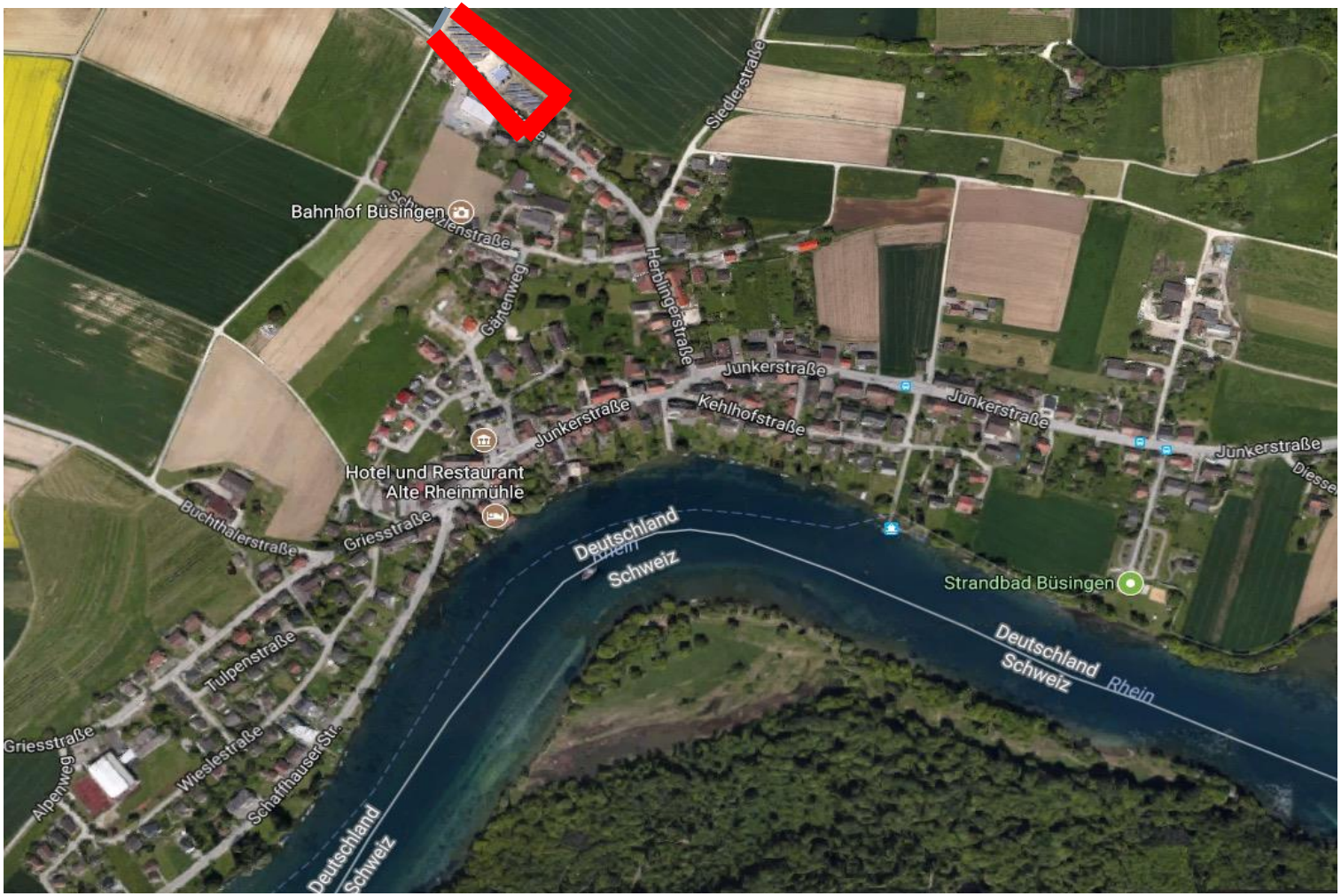
BÜSINGEN (GERMANY)



BÜSINGEN (GERMANY)



LAND OCCUPATION…?



Source: Google Maps

LAND OCCUPATION…?

Source: Google Maps

DIFFERENT INSTALLATION SOLUTIONS

DIFFERENT INSTALLATION SOLUTIONS

SIMMERN (NEUERKIRCH-KÜLZ) (GERMANY)

- 4.200 MWh/year
- 6,1 km
- 800 consumers
- Solar thermal (evacuated tubes): 1,422 m²
- 120 m³ storage
- 4,5 M€
- 100% loan from KfW bank
- Interest rate: 0.05-0.25%

Source: Guido Bröer

ELLÖS (SWEDEN)

- 4 MW_{th} biomass boiler
- 1,000 m² solar thermal
- 200 m³ storage
- Yearly solar coverage: 10%
- Biomass boiler **turned off in summer**

NORDBY-MÅRUP, SAMSØ (DENMARK)

- 1 MW_{th} wood chip boiler
- 2,500 m^2 solar thermal
- 800 m^3 storage
- 2-3 ‘no-sun days’

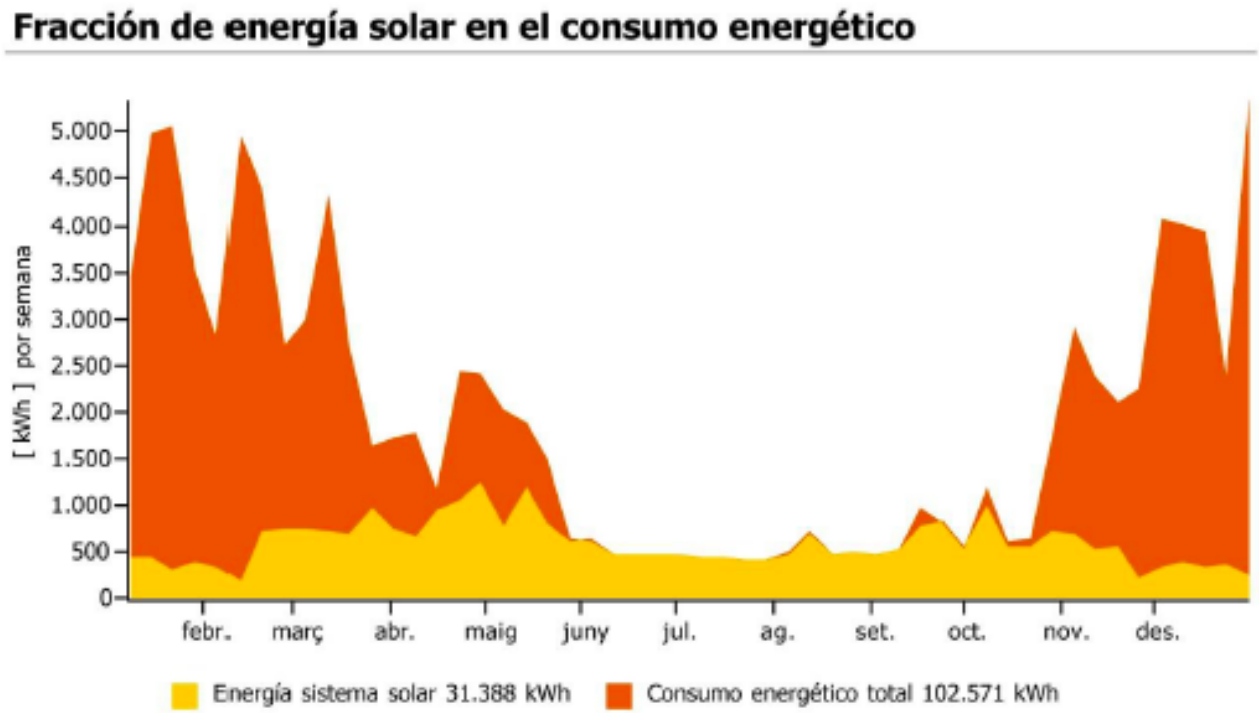
NOT ONLY IN THE NORTH… SPAIN

Ispaster (Basque Country)

90 kW_{th} biomass

60 m^2 solar thermal

NOT ONLY IN THE NORTH… SPAIN



NOT ONLY IN THE NORTH… FRANCE

Source: TECSOL

- Châteaubriant
- 10 km, 19 GWh/year
- Biomass + gas + …

NOT ONLY IN THE NORTH… FRANCE

- Almost 2,500 m^2 solar thermal
- 150 m^3 storage
- 1.4 M€ (600 €/m^2)
- 70% financing by ADEME

NOT ONLY IN THE NORTH… ITALY

Annual yield: 490 kWh/m² (+13%)

990 m² solar thermal in Varese

OBJECTIVE OF S&B SYNERGY

- Sizing the solar thermal plant for a 100% summer coverage (domestic hot water + thermal losses)
- Thus meaning 10-20% (depending on the storage size) annual solar coverage

- Turn off the biomass boiler/s in summer (and possibly in the intermediate seasons) for:
  - Saving fuel (and, therefore, operating costs)
  - Reducing partial load operation
  - Allowing time for maintenance, personnel holidays, etc.

ON-FIELD REAL RESULTS

- Austria: The back-up boiler in summer only covers 1% of the annual heat needs

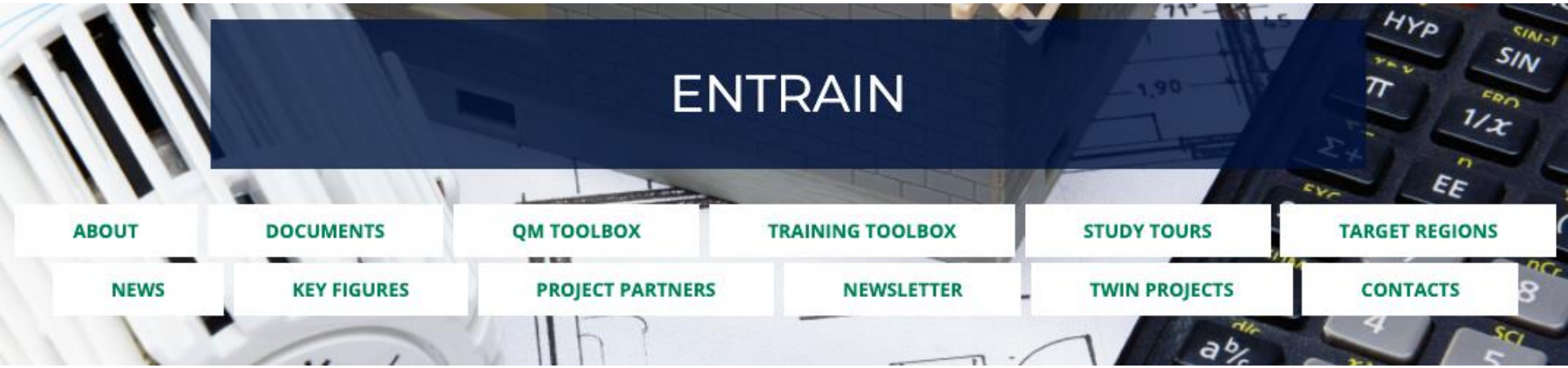
- Büsingen:
  - Full solar coverage: End June – Mid August
  - June and September: Solar + small biomass (or oil)
  - Large biomass boiler off from June to mid October
  - With a ‘normal’ storage

SOLAR HEAT COST: AN EXAMPLE FOR ITALY

- 2,000 m^2 solar thermal
- Investment: 800,000 €
- Incentive: 500,000 €
- 10-years loan

- Heat production cost (**over 15 years**):
  - 53 €/MWh (6% interest rate)
  - 42 €/MWh (4% interest rate)
  - 31 €/MWh (2% interest rate)

HAVE A LOOK
AT OUR ONLINE RESOURCES



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